RESEARCH ARTICLE   OPEN ACCESS

Coconut Products Manufacturing Dashboards

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Abstract:

The Coconut Products Manufacturing Dashboard is a web-based business intelligence system developed to monitor and analyze procurement, production, inventory, and sales operations in coconut product industries. The system integrates a frontend interface for structured data entry, a backend relational database for secure data storage, and Power BI for interactive visualization and analytics. It transforms raw operational data into meaningful insights through dashboards displaying key performance indicators such as production efficiency, revenue, profit margins, stock levels, and wastage analysis. By automating data management and reporting processes, the system reduces manual errors, enhances transparency, and supports data-driven decision-making for improved operational efficiency and sustainable business growth.

Keywords- Integrated Dashboard System, Business Intelligence, Inventory Monitoring, Sales Analytics, Manufacturing Analytics.

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I.   INTRODUCTION

Coconut-based products such as coconut oil, copra, coconut milk, and coconut powder play an important role in food processing and agricultural industries. However, many manufacturing units still rely on manual record maintenance for procurement, production, and sales management. This manual system leads to inaccuracies, poor stock tracking, delayed reporting, and inefficient decision-making.

Coconut is one of the most important agricultural resources in tropical countries like India. It is widely used to manufacture various value-added products such as coconut oil, coconut milk, coconut powder, desiccated coconut, coir products, and other by-

products. The coconut manufacturing industry plays a significant role in rural employment and economic development.

The manufacturing process involves multiple stages including raw material procurement, processing, quality checking, packaging, inventory management, and sales distribution. Each stage generates large volumes of operational data. Managing this data manually using registers or spreadsheets often leads to errors, data redundancy, and difficulty in tracking overall performance.

With the advancement of web technologies and business intelligence tools, it is possible to automate

manufacturing operations and generate real-time analytical insights.

In today's competitive business environment, industries require accurate and real-time insights to improve productivity and profitability. Business Intelligence (BI) tools such as Microsoft Power BI enable organizations to convert raw data into meaningful visual insights through interactive dashboards and reports. These dashboards help management monitor Key Performance Indicators (KPIs) such as production quantity, sales revenue, profit margins, inventory stock levels, and wastage percentage.

Business Intelligence systems support strategic decision-making in manufacturing industries [3].

II. LITERATURE SURVEY

Many industries have adopted Business Intelligence (BI) tools to improve operational efficiency and decision-making.

Earlier, organizations used traditional reporting systems and manual data analysis, which were time-consuming and less accurate. With the advancement of data analytics tools like Power BI, Tableau, and Excel BI, companies can now create interactive dashboards for better analysis.

Research shows that dashboards help management monitor Key Performance Indicators (KPIs) such as production rate, inventory levels, and sales growth. Manufacturing dashboards improve transparency, reduce wastage, and enhance productivity.

However, small-scale industries, especially in agriculture-based sectors like coconut manufacturing, still lack proper data visualization systems. Therefore, implementing a Power BI-based dashboard can significantly improve operational efficiency in coconut product industries.

Interactive dashboards improve operational transparency and performance monitoring [1].

BI system design and implementation strategies are widely discussed in recent research [7].

III. PROBLEM STATEMENT

Manufacturing industries face operational inefficiencies due to lack of integrated data management systems. The absence of real-time monitoring leads to overstocking or understocking of craw materials and finished goods. Production tracking becomes difficult without structured records. Sales performance analysis requires time-consuming manual calculations. Profit margins cannot be accurately measured without systematic financial tracking. Supplier performance evaluation becomes inconsistent due to scattered records.

The coconut products manufacturing industry generates large amounts of data related to procurement, production, inventory, sales, and wastage.

These issues reduce operational efficiency and affect profitability. Therefore, there is a need for an integrated dashboard system that automates data management, maintains accurate records, and provides real-time analytical insights for effective decision-making.

Managing this data manually leads to:
1. Data duplication and errors
2. Lack of real-time insights
3. Difficulty in tracking profit and loss
4. Poor inventory management
5. Inefficient decision-making

There is a need for an interactive and automated dashboard system that can analyze manufacturing data and provide meaningful insights to management.

Therefore, there is a strong need for an automated, interactive, and data-driven dashboard system that can transform raw manufacturing data into meaningful visual insights.

Manual record maintenance often leads to redundancy and inconsistency in data storage [4], [5].

IV. PROPOSED SYSTEM

The proposed system is a web-based Coconut Products Manufacturing Dashboard that integrates frontend, backend database, and Power BI analytics.

The system consists of three main components:

1. Frontend Interface
2. Backend Database
3. Power BI Reporting Dashboard

The proposed Coconut Products Manufacturing Dashboard consists of three major components: a frontend interface, a backend database, and a Power BI analytics layer.

The frontend provides secure login authentication and user-friendly forms for entering procurement, production, inventory, and sales data. The backend database stores all records in structured relational tables, ensuring data integrity and eliminating redundancy. Power BI connects directly to the database and generates interactive dashboards that display production trends, sales performance, stock levels, and profit analysis.

The system ensures smooth data flow from data entry to visualization. All calculations such as total procurement cost, production output, revenue generation, and profit margins are automatically computed. This automation reduces manual effort and enhances accuracy.

The data is cleaned and transformed using Power Query.

Relationships between tables are created using data modelling. Various visualizations such as bar charts, pie charts, line graphs, KPI cards, and slicers are used to create an interactive dashboard.

The dashboard enables management to:

1. Monitor daily/monthly production
2. Track sales trends
3. Analyze profit margins
4. Identify high-demand products
5. Reduce raw material wastage

Data modeling techniques improve structured storage and analytical processing [2].

The dashboard was developed using Microsoft Power BI tools [8].

V. SYSTEM ARCHITECTURE

The system architecture of the Coconut Products Manufacturing Dashboard follows a structured three-tier model consisting of the Presentation Layer, Application/Data Layer, and Analytics Layer.

This layered architecture ensures modularity, scalability, and efficient data handling throughout the system. The Presentation Layer manages user interaction through secure login authentication and data entry forms for procurement, production, inventory, and sales operations. It provides a user-friendly interface that simplifies operational data management for staff and administrators.

The Application or Data Layer acts as the core of the system, where all operational data is stored in a relational database. This layer ensures data integrity, consistency, and secure storage using structured tables and relationships. It also performs essential processing tasks such as validation, stock updates, cost calculations, and revenue computation. By separating

data handling from the user interface, the system improves reliability and maintainability.

Overall, the system architecture ensures smooth data flow from user input to analytical output.

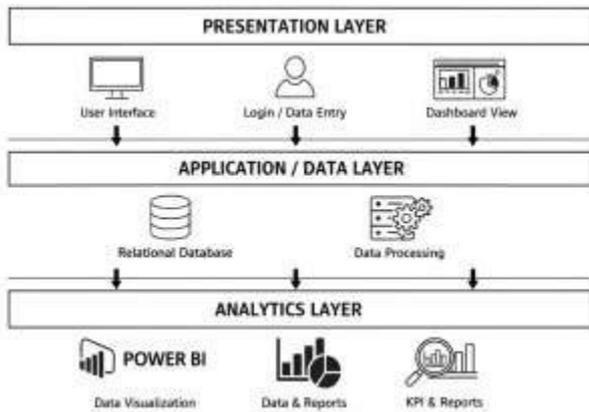The relational database ensures data integrity and consistency [4].

Figure 1: Three-Layer System Architecture of the Proposed Dashboard

VI. RESULTS AND DISCUSSION

The Coconut Products Manufacturing Dashboard was successfully developed using Power BI.

The dashboard provides:

1. Clear visualization of production trends
2. Sales and revenue analysis
3. Profit calculation
4. Inventory stock monitoring
5. Wastage tracking

The interactive features allow users to filter data by date, product type, and category. This improves decision-making efficiency and business performance.

The system reduces manual work and provides accurate real-time insights. The Coconut Products Manufacturing Dashboard was successfully developed and tested.

The system effectively recorded procurement, production, inventory, and sales data.

The Power BI dashboard provided clear visualization of business performance. The system reduced manual errors and improved operational transparency.

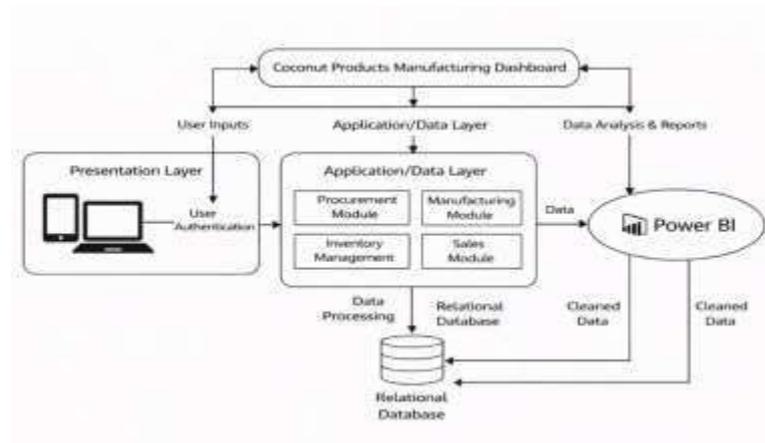Data mining and analytical techniques help extract meaningful insights from operational data [6].

Figure 2: Analytical Results of the Proposed Coconut Products Manufacturing Dashboard.

VII. CONCLUSION

The Coconut Products Manufacturing Dashboard successfully demonstrates how business intelligence tools can enhance operational efficiency in manufacturing industries.

By integrating data entry, database management, and Power BI analytics into a unified system, the project ensures accuracy, automation, and real-time performance monitoring.

The system improves transparency, reduces manual effort, and enables management to make informed strategic decisions, thereby increasing productivity and profitability.

Business Intelligence systems enhance productivity and support informed decision-making [3].

VIII.   FUTURE SCOPE

The Coconut Products Manufacturing Dashboard can be further enhanced with advanced technological improvements to increase its efficiency, scalability, and intelligence. In the future, the system can be extended to support mobile application integration, allowing managers and staff to monitor production, inventory, and sales data remotely from smartphones or tablets. This would improve accessibility and enable real-time monitoring from any location.

Another important enhancement would be the implementation of predictive analytics using machine learning techniques. By analyzing historical sales and production data, the system can forecast future demand, optimize production schedules, and prevent overproduction or stock shortages. This would improve resource utilization and increase profitability.

Overall, the future scope of this project lies in transforming the dashboard into a fully automated, intelligent, and scalable manufacturing management system that supports smart decision-making and sustainable industrial growth.

Machine learning and data mining techniques can be applied for demand forecasting [6].

IX.   REFERENCES

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